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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/692,403	10/23/2003	Zafir Abdo	2003P14606US	8501

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EXAMINER	
BEVERIDGE, RACHEL E	

ART UNIT	PAPER NUMBER
1725	

DATE MAILED: 09/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/692,403	ABDO ET AL.	
	Examiner	Art Unit	
	Rachel E. Beveridge	1725	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 October 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) *19-24* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *1-24* are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *10/23/2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1-18, drawn to a materials joining process, classified in class 228, subclass 173.1.

II. Claims 19-24, drawn to a materials joint product, classified in class 403, subclass various.

The inventions are distinct, each from the other because of the following reasons:

Inventions group I and group II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In this case, the materials joining process can be used to create a different materials joint product and the materials joint can be formed via other material fusion methods.

Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

During a telephone conversation with John Musone on August 18, 2005 a provisional election was made with traverse to prosecute the invention of group I, claims 1-18. Affirmation of this election must be made by applicant in replying to this Office

action. Claims 19-24 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Specification

The abstract of the disclosure is objected to because it contains specific references to figures disclosed by the applicant. Please summarize the invention without specific reference to other elements of the application. Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 14 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It was interpreted by the examiner that the first substrate and second material (defined as the second substrate by claim 13) were separate from each other and thus bonded via the steps disclosed in applicants claim 12. However, the claim is indefinite because the claim references the grains of the second material growing into the second substrate (thus, the grains are nucleating within itself and no bonding occurs) during heating and the specification does not clearly demonstrate this idea.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2,5, and 10-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Burke et al. (US 6,325,871 B1).

Regarding claim 1, Burke discloses that the surfaces for transient liquid phase bonding can be cold worked (Column 11, lines 39-40) and specifies that the bonding material is similar to the base material but also contains a melting point depressing element that rapidly diffuses in the alloy (Column 6, lines 12-15). Furthermore, Burke discloses that "as the boron rich foil melts it wets the base material on either side of the bond and causes some dissolution of the base metal and a wider liquid zone" (Column 6, lines 23-25) and that "simultaneously solid state diffusion causes boron to be removed from the bond pool environs" (Column 6, lines 28-30). Burke also states that there is isothermal re-solidification of the bond pool until the two solidification fronts meet near the center line of the bond (Column 6, lines 30-33).

With respect to claim 2, Burke's disclosure of figure 16 clearly shows two surfaces being joined together, and states the turbine blade comprises of two sections (12 and 14) and excess material (16 and 18) is provided at the interfacing surfaces (Column 15, lines 31-35). Furthermore, Burke discloses that sets of crystal and

polycrystalline superalloys can be joined using foils and thermal cycles (Column 17, lines 45-49).

Regarding claim 5, the non-cold worked opposing surface can be viewed as the second side of a particular substrate. Therefore, a substrate having one side cold worked and the other side not cold worked can be bonded via transient liquid phase bonding of its cold worked side to another cold worked substrate according to Burke's disclosure of the bonding of cold worked surfaces in column 11, lines 39-40.

With regard to claim 10, Burke discloses a turbine blade comprising two sections (Fig. 16(12&14)) and excess material (Fig. 16(16&18)) is provided at the interfacing surfaces (Column 15, lines 31-35). Burke also discloses that bonding is "generally achieved by matching the bond foil chemistry to the base metal chemistry" (Column 18, lines 51-53) and that the bond foil is "similar to the base material but it also contains an extra addition of melting point depressing element" (Column 6, lines 12-15). Thus, any insert that is the same or similar composition as the substrate material should exhibit the same or similar grain structure as the base material. Burke discloses that the surfaces for transient liquid phase bonding can be cold worked (Column 11, lines 39-40) and states that there is isothermal re-solidification of the bond pool until the two solidification fronts meet near the center line of the bond (Column 6, lines 30-33). Furthermore, Burke discloses that the isothermal bonding process can be controlled to reproduce the chemistry and microstructure of the base material within the bond zone (Column 6, lines 34-38).

With respect to claim 11, Burke states that "as the boron rich foil melts it wets the base material on either side of the bond and causes some dissolution of the base metal and a wider liquid zone" (Column 6, lines 23-25) and that "the bonding temperature should be sufficient to melt the bond foil and a similar thickness of the base material to produce a fine, well mixed bond zone" (Column 6, lines 44-46).

With respect to claim 12, Burke discloses that the surfaces for transient liquid phase bonding can be cold worked (Column 11, lines 39-40) and specifies that the bonding material is similar to the base material but also contains a melting point depressing element that rapidly diffuses in the alloy (Column 6, lines 12-15). Furthermore, Burke discloses that "as the boron rich foil melts it wets the base material on either side of the bond and causes some dissolution of the base metal and a wider liquid zone" (Column 6, lines 23-25) and that "simultaneously solid state diffusion causes boron to be removed from the bond pool environs" (Column 6, lines 28-30). Burke also states that there is isothermal re-solidification of the bond pool until the two solidification fronts meet near the center line of the bond (Column 6, lines 30-33). Thus, the second material can be the bonding material, which will grow into the said substrate surface during the heating step of transient liquid phase bonding.

Regarding claim 13, the second material comprising a second substrate with a surface is interpreted as being a foil or any other bonding material that is used in the transient liquid phase bonding process. Therefore, Burke's disclosures of the elements discussed in claim 12 above are applicable.

With respect to claim 14, it was interpreted that the first substrate and second material (defined as the second substrate by claim 13) were separate from each other and thus bonded via the steps disclosed in applicants claim 12. Therefore, Burke's disclosures of the elements discussed in claim 12 above are applicable

With regard to claim 15, Burke discloses that "as the boron rich foil melts it wets the base material on either side of the bond and causes some dissolution of the base metal and a wider liquid zone" (Column 6, lines 23-25) and that "simultaneously solid state diffusion causes boron to be removed from the bond pool environs" (Column 6, lines 28-30). Burke also states that there is isothermal re-solidification of the bond pool until the two solidification fronts meet near the center line of the bond (Column 6, lines 30-33).

With respect to claim 16, Burke discloses that sets of crystal and polycrystalline superalloys can be joined using foils and thermal cycles (Column 17, lines 45-49). Burke also discloses, "the bonding temperature should be sufficient to melt the bond foil and a similar thickness of the base material to produce a fine, well mixed bond zone" (Column 6, lines 44-46).

Regarding claim 17, Burke's disclosure of figure 16 clearly shows two surfaces being joined together, and states the turbine blade comprises of two sections (12 and 14) and excess material (16 and 18) is provided at the interfacing surfaces (Column 15, lines 31-35). Furthermore, Burke discloses that sets of crystal and polycrystalline superalloys can be joined using foils and thermal cycles (Column 17, lines 45-49) and that "as the boron rich foil melts it wets the base material on either side of the bond and

causes some dissolution of the base metal and a wider liquid zone" (Column 6, lines 23-25).

With respect to claim 18, it was interpreted that the substrate can be any material that can bond to the first substrate in the claimed manner; thus, rendering it possible for the insert to be labeled a substrate. Burke specifies that the bonding material is similar to the base material but also contains a melting point depressing element that rapidly diffuses in the alloy (Column 6, lines 12-15). Burke also discloses, "the bonding temperature should be sufficient to melt the bond foil and a similar thickness of the base material to produce a fine, well mixed bond zone" (Column 6, lines 44-46). Furthermore, Burke discloses that "as the boron rich foil melts it wets the base material on either side of the bond and causes some dissolution of the base metal and a wider liquid zone" and that solid state diffusion simultaneously causes the boron to be removed from the bond pool environs and the two processes deplete the melting point depressant from the bond pool. Therefore, isothermal re-solidification of the bond pool occurs until the two solidification fronts meet near the center of the bond (Column 6, lines 23-33).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Burke et al. (US 6,325,871 B1) as applied to claim 2 above. Burke does not specifically state that the process should be used for joining substrate surfaces that have been cold worked to a different degree. However, Burke does disclose particular stresses of cold working for desired re-crystallization after heat treatment (Column 11, lines 39-40; Column 11, lines 55-60; and Column 13, lines 51-54). Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify the substrates of Burke's transient liquid phase bonding process (if the surfaces are not already similar in chemical and microstructure) to have two surfaces cold worked to different degrees in order to produce the similar chemistry and microstructure in the bond zone that exists in the bulk of the substrate materials (Column 18, lines 48-51).

Claims 4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burke as applied to claim 1 above, and further in view of Stenard et al. (US 5,415,336). With respect to claim 4, Burke does not disclose a range of cold working stress to any one surface of a substrate. Stenard discloses shot peening the substrate surfaces before diffusion bonding. Stenard discloses a range of effective cold working time and rotation of the shot peening device as well as an approximate distance from the surface (Column 2, lines 34-38). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the process disclosed by Burke to have a surface with an uneven pattern of cold working stress in order to induce stress upon the surface without damaging the underlying layers of the substrate making it difficult to

proceed with diffusion bonding (Stenard et al., column 2, lines 17-21 and column 1, lines 52-54).

Regarding claim 6, Burke does not disclose shot peening the substrate surface within the range of 8-16 of the Almen scale. However, Stenard discloses the preferred parameters for the steel shot to be delivered at "a pressure of 50-80 psi (the resulting Almen intensity is near 10)" (Column 2, lines 27-30). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the process of Burke with the shot peening measurements of Stenard in order to induce stress upon the surface without damaging the underlying layers of the substrate making it difficult to proceed with diffusion bonding (Stenard et al., column 2, lines 17-21 and column 1, lines 52-54).

Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burke et al. (US 6,325,871 B1) as applied to claim 1 above. Burke does not specifically state that the substrate should be sufficiently cold worked in order to cause the grains to grow into the substrate at least twice, three, or four times the thickness of the molten region. However, Burke does discloses that that "as the boron rich foil melts it wets the base material on either side of the bond and causes some dissolution of the base metal and a wider liquid zone" (Column 6, lines 23-25). Burke also discloses that the "that "the bonding temperature should be sufficient to melt the bond foil and a similar thickness of the base material" (Column 6, lines 44-46). Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify the substrates of Burke's transient liquid phase bonding process to cold work the substrate

sufficiently to cause the grains to grow into the substrate at least two to four times the thickness of the molten region in order to "produce a fine, well mixed bond zone" (Column 6, line 46).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rachel E. Beveridge whose telephone number is (571) 272-5169. The examiner can normally be reached on Monday through Friday, 8:30 am to 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Dunn can be reached on (571) 571-1171. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JONATHAN JOHNSON
PRIMARY EXAMINER

REB